

MAY 02 2001  
PATENT & TRADEMARK OFFICE

PTO/SB/95 (06-1999)  
Approved for use through 5/31/2002. OMB 0651-0030  
Patent and Trademark Office, U.S. DEPARTMENT OF COMMERCE

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

## Disclosure Document Deposit Request

Mail to:

Box DD  
Assistant Commissioner for Patents  
Washington, DC 20231

Inventor(s):

Jorge L. Lombana

Title of Invention:

SEPARATOR FOR FLUIDS AND SOLIDS

Enclosed is a disclosure of the above-titled invention consisting of 7 sheets of description and        sheets of drawings. A check or money order in the amount of \$10.00 is enclosed to cover the fee (37 CFR 1.21(c)).  
*ENCLOSED CHARGE AUTHORIZATION*

The undersigned, being a named inventor of the disclosed invention, requests that the enclosed papers be accepted under the Disclosure Document Program, and that they be preserved for a period of two years.

Signature of Inventor

Jorge L. Lombana

Typed or printed name

5/2/01

Date

Address

11000 S.W. 47th Street

Miami, Florida 33165

City, State, Zip

### NOTICE TO INVENTORS

#### DISCLOSURE DOCUMENT NO.



493251

RETAINED FOR 2 YEARS  
THIS IS NOT A PATENT APPLICATION

PTO-1652 (8/99)

This Disclosure Document is not a patent application, nor will its receipt date in any way affect a patent application. A Disclosure Document may be relied upon only as evidence of invention. A Disclosure Document should be filed if patent protection is desired.

After the date it was received by the Patent and Trademark Office (PTO) and will be used in a patent application filed within the two-year period. The Disclosure Document may be used in a patent application or by a separate letter filed in a pending application. Unless it is desired to use the Disclosure Document in a patent application, it is not required that it be referred to in the patent application.

A "grace period" during which the inventor can wait to file his/her patent application is recognized that in establishing priority of invention an affidavit or testimony referring to a Disclosure Document must usually also establish diligence in completing the invention or in filing the patent application since the filing of the Disclosure Document.

If you are not familiar with what is considered to be "diligence in completing the invention" or "reduction to practice" under the patent law or if you have other questions about patent matters, you are advised to consult with an attorney or agent registered to practice before the PTO. The publication, *Attorneys and Agents Registered to Practice Before the United States Patent and Trademark Office*, is available from the Superintendent of Documents, Washington, DC 20402. Patent attorneys and agents are also listed in the telephone directory of most major cities. Also, many large cities have associations of patent attorneys which may be consulted.

You are also reminded that any public use or sale in the United States or publication of your invention anywhere in the world more than one year prior to the filing of a patent application on that invention will prohibit the granting of a patent on it.

Disclosures of inventions which have been understood and witnessed by persons and/or notarized are other examples of evidence which may also be used to establish priority.

There is a nationwide network of Patent and Trademark Depository Libraries (PTDLs), which have collections of patents and patent-related reference materials available to the public, including automated access to PTO databases. Publications such as *General Information Concerning Patents* are available at the PTDLs, as well as the PTO's Web site at [www.uspto.gov](http://www.uspto.gov). To find out the location of the PTDL closest to you, please consult the complete listing of all PTDLs that appears on the PTO's Web site or in every issue of the *Official Gazette*, or call the PTO's General Information Services at 800-PTO-9199 (800-786-9199) or 703-308-HELP (703-308-4357). To ensure assistance from a PTDL staff member, you may wish to contact a PTDL prior to visiting to learn about its collections, services, and hours.

**Burden Hour Statement:** This collection of information is used by the public to file (and by the PTO to process) Disclosure Document Deposit Requests. Confidentiality is governed by 35 USC 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed Disclosure Document Deposit Request to the PTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, Washington, D.C., 20231. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Assistant Commissioner for Patents, Washington, D.C. 20231.

\* SEE ENCLOSED CHARGE AUTHORIZATION \*

11002 U.S. PTO  
09/865994  
05/26/01

## CENTRIFUGAL FILTER

## FIELD OF THE INVENTION

The present invention relates to a centrifugal filter.

## BACKGROUND OF THE INVENTION

For separating particles from liquids, centrifuges with rotating barrels or travelling baskets are often used, in which the filtrate formed by the solid particles is retained as a residue on a filtering cloth or filtering bag. For the removal of residual layers from the barrel a mechanism is, for example, used therein which carries out a mechanical scraping of the barrel wall.

Such device have been found to be disadvantageous in view of the fact that the removal of residual layers is relatively involved.

It is therefore the object of the present invention to create a centrifugal filter which permits the efficient emptying of the travelling basket.

## SUMMARY OF THE INVENTION

A significant advantage of the centrifugal filter according to the invention resides therein that, in contrast to known mechanical scraping blades which are unsuitable for scraping residual layers for example up to 4 or 5 mm in particular at the edges, they permit the complete emptying of the filtering cloth.

A further advantage of the centrifugal filter according to the invention is that, in contrast to the emptying scraping blades which destroy filtered-out crystals, it is exceptionally well suited for removing crystals carefully.

## BRIEF DESCRIPTION OF THE DRAWINGS

In the following the invention will be explained by example in further detail with reference to the drawings of which

FIG. 1 a schematic representation in section of a first embodiment of a centrifugal filter according to the invention,

FIG. 2 a schematic cross-sectional representation of the lifting device of such centrifugal filter,

FIG. 3 a schematic sectional representation of the collector chamber of this centrifugal filter,

FIG. 4 a schematic top view onto this collector chamber,

FIG. 5 a representation according to FIG. 1, however, with filter cake,

FIG. 6 a representation according to FIG. 1, however, with a filtering cloth stretched downwardly,

FIG. 7 a schematic representation in section according to a second embodiment of a centrifugal filter according to the invention, and

FIG. 8 a representation according to FIG. 7, however, with a filtering cloth stretched upwardly.

The centrifugal filter according to FIG. 1 comprises a resting collector chamber 1 preferably realized in annular form, which rests over a machine body 2 on a support 3 and is closed with a cover 4. Within the collector chamber 1 is disposed a travelling basket 5 with a barrel 6 and a travelling basket neck 7. The machine body 2 encompasses a bearing housing 8 with fixed ribs 9 (FIG. 4). In the bearing housing 8 are disposed a lower bearing 10 and an upper bearing 11

for the drive shaft 12 of the travelling basket 5. The upper part of the drive shaft 12 is connected with the shaft head 13 of a travelling basket hub 14 whose lower portion is connected with ribs 15 implemented in the lower portion of the travelling basket neck 7. The barrel 6 of the travelling basket 5 is implemented so as to be approximately C-shaped and encompasses a center vertical barrel shell 16 a lower barrel bottom 17 approximately radial and an upper annular barrel cover wall 18, approximately radial. The barrel bottom 17 is implemented as a connection between the travelling basket neck 7 and the barrel shell 16. The travelling basket 5 which consequently comprises the elements 18, 16, 17, 7 (15), 14 (13), and 12, is therefore supported in the centrifugal filter so as to be vertically rotatable via bearings 10 and 11.

In the upper region of the barrel shell 16 is disposed in the interior an annular fastening device 19 for a filter element 20, for example a filtering cloth or a filtering bag. The vertical portion of the travelling basket neck 7 and the vertical lower portion of the travelling basket hub 14 define an annular-cylindrical displacement volume into which a filter clamp device or lifting device can be partially shifted, comprising a vertical piston 23 and an outer fastening device 24 connected with it via radial ribs 25, which can be, for example, a filter fastening ring.

The piston 23 is actuated electrically or hydraulically in order to move it in the vertical direction. For this purpose the drive shaft 12 can, for example, be connected via a hinge-rotary head 26 with corresponding fluidic connections 27. The rotary head 26 comprises a packing head for two separate fluidic circulations 28, in FIG. 1 only indicated, for transmitting fluid pressure from the stationary machine body 2 to the rotating drive shaft 12. The pressure is carried through the drive shaft 12 and through the travelling basket hub 14 onto the piston 23.

The upper portion of the centrifugal filter can be realized according to prior art with an oblique filling dish 29 or with a filling dish or with a filling tube.

FIG. 2 shows that the lifting device 22 can comprise, for example, five ribs 25, which are congruent with the five ribs 15 of the travelling basket 5. Between these ribs are present five passage openings 30.

FIGS. 3 and 4 show that the outer portion of the collector chamber 1 is connected via three ribs 9 with the bearing housing 8, and that between these three ribs 9 passage openings 30' are present in order to make possible communication with the so-called product volume. Furthermore are provided two passage channels 31, 31', isolated from the product volume, in which the drive belts for the motion of the drive shaft 12 are disposed.

The centrifugal filter according to FIGS. 1 to 6 functions in the following manner:

The barrel shell 16 is provided in the customary manner with holes, not depicted in the drawing so that the liquid can flow out by centrifugal force when the travelling basket 5 is rotated.

The supplied liquid containing solid particles in suspension is sprayed laterally at the bottom through centrifugal force from a potentially rotating ejector in the collector chamber 1. Since barrel 6 also rotates, the liquid moves through the pores or mesh of the filtering cloth 20 or 20' and through the holes of the barrel shell 16 into the collector chamber 1, from which it can escape through the drainage tube 43 (FIG. 4). Through the centrifugal force of the rotating barrel 6 the coating or cake formed by the solid particles is generated in the interior of the filtering cloth.

The filter element, filtering cloth or the like is held at the top by fastening device 19 (FIG. 1) and at the bottom

through filter fastening ring 24. In the normal position the filter fastening ring 24 is located in the upper region of the travelling basket neck 7, as depicted in FIGS. 1 and 5. The travelling basket 5 can be filled in the three ways mentioned above and FIG. 5 depicts the position of cake 32 if the barrel 6 is full. For emptying the centrifuge the travelling basket 5 is slowed down to emptying speed. Via a rotary button the lifting device 22 is pressurized with compressed gas or electrically and thereby brought into the lower final position so that the filter fastening ring 24 pulls the lower edge of the filter element 20 in the downward direction which is forced into a conical shape according to FIG. 6. Through this mechanical deformation of the filter element the cake 32 (FIG. 5) is detached which subsequently, due to gravity, slides through the passage openings 30 and 30' from the machine which represents a very clean and fast operation. Subsequently the piston 23 is actuated in order to move it into its zero position (upper position) so that the next charging process can be started.

In the embodiment according to FIG. 7 and 8 the filter element is fixed below, for example in the upper region of the travelling basket neck 7 through a filter fastening device 33. The filter element or filtering cloth, which in this case is also realized cylindrically, at least in a central region, so that it can rest in the interior of the travelling basket 5, is fastened above with the aid of a fastening device 34 on a cover device 35 which covers the inner opening of an annular barrel cover wall 18'. The collector chamber in this case is closed with a cover 4 comprising a center tubular holding device 36 for a lifting body 37, which comprises a lifting platform 38 and a longitudinal guidance 39 on which a guidance sleeve 40 for a filling tube 41 is rotatably supported. The holding device 36, longitudinal guidance 39, guidance sleeve 40 and the filling tube 41 are disposed coaxially with little free motion such that the guidance sleeve 40, connected below with the cover device 35, can rotate with it and, consequently, also with the travelling basket 5 even if parts 36, 39 and 41 are at rest. For this purpose two axial bearings each are provided in the lower and in the upper region of this part. The platform 38 is connected movably via a mechanical, electrical, pneumatic or hydraulic mechanism 42 (FIG. 8) with the holding device 36 or with the cover 4' in such a way that the cover 35 can complete a vertical lifting motion in order to pull the filtering cloth 20' upward (FIG. 8). The operating function of the centrifugal filter according to FIGS. 7 and 8 is similar to the embodiments according to FIGS. 5 and 6 with the difference that the filter element is stretched upwardly.

The filtering cloth 20, 20' is preferable connected frictionally or detachably with the filter fastening ring 24 or 33 and with the fastening device 19 or 34 (FIG. 7). Since the inner diameter of the barrel shell 16 (FIG. 1) is greater than the outer diameter of the travelling basket neck 7, it is possible for several longitudinal, at least approximately vertically directed, folds distributed over the circumference to develop in an at least approximately cylindrical filtering cloth 20 or 20'. For this purpose, the filtering cloth is realized so as to be relatively flexible so that, due to the folds, it can be pressed more or less closely against the inner side of the barrel shell 16 through the centrifugal force.

The cover 4 or 4' can be provided with a nitrogen inlet so that the collector chamber forms a completely closed system exposed to  $N_2$ .

In the centrifugal filter according to FIG. 1 or FIG. 7, consequently, the height of the collector chamber 1 is greater than the height of the barrel shell 16, in order to separate within the collector chamber 1 with the aid of the lifting

device 22 or 42 the ring 24 or 34 from the barrel edge and to shift it so far downward or upward that the filtering cloth is completely stretched. The filtering cloth 20 or 20' must be so flexible and dimensioned so that, in spite of its funnel form proper, assumed preferably through the folds, it can adapt well to the inner wall of the barrel shell 16.

In a further embodiment of the invention the cover 4, 4' can be opened and subsequently shifted and/or pivoted laterally in order to permit opening the entire centrifugal filter.

The collector chamber 1 can be provided with a further opening in order to generate a vacuum so that the filtration can be accelerated. In this case, the nitrogen inlet can be closed or it can be omitted. It is understood that such openings can also be provided with valves.

In a further embodiment of the invention the collector chamber 1 and the travelling basket 5, which according to prior art can comprise stainless steel in various qualities, are protected on the inside with a plastic coating comprising, for example, Teflon.

Between the filtering cloth 20 or 20' and the barrel shell 6 a support net can be present. During the filtration the lower termination of the bearing arrangement can be closed with a covering not depicted in the Figures. Emptying the filtering clothing can also be carried out by shaking the clamping ring with the aid of the lifting device 22 or 42.

In practice, for centrifugal filters of this type preferably filtering cloths can be used comprising polypropylene or Teflon having a thickness of for example 1 mm and a mesh size of 5 to 100  $\mu$ m.

According to another embodiment of the invention the bearing of the travelling basket can be disposed on the outside between the machine body and the travelling basket neck which in this case comprises a center opening whose diameter is smaller than the inner diameter of the ball bearing, which can be used for example for supporting the travelling basket. Such support can comprise, for example, an upper ball bearing and a lower angular bearing. The travelling basket which, thus, is disposed so as to be rotatable about a vertical axis and whose neck is thus realized as hollow driving shaft, communicates via the center opening of the travelling basket neck with a lower emptying volume for the separated solid particles. In this embodiment a part of the lifting device can also be mounted stationarily on the outside so that it can also be actuated purely mechanically as shown in the example according to FIG. 7.

It is evident from FIGS. 1, 3, 7, and 8 that the travelling basket hub 14 can, for example, extend from the travelling basket neck 7 to a relatively high point in the inner region of the travelling basket.

We claim:

1. A centrifugal filter, comprising:

- a) a collector chamber;
- b) a machine body supporting said collector chamber;
- c) a rotatable filter basket having a perforated barrel and a basket neck, said filter basket being disposed in the interior of the collector chamber;
- d) a bearing housing having a bearing device comprising a rotatable drive shaft for the filter basket, said machine body having a portion supporting said bearing housing and having at least one opening;
- e) a hub driven by said drive shaft and connected with a portion of said basket neck, wherein said portion of said basket neck has at least one basket neck bottom opening;

5

f) a filter element having a first edge connected with the filter basket; and

g) lifting means to which is connected a second edge of said filter element so as to move said second edge in a direction between a folded position of said filter element and a stretched position of said filter element.

2. The centrifugal filter as defined in claim 1, wherein the connection of said second edge of said filter element to said lifting means defines a space which together with said at least one opening of said portion of said basket neck defines a passage of said basket neck.

3. The centrifugal filter as defined in claim 2, wherein the connection of said second edge of said filter element to said lifting means comprise connection ribs forming spaces between them which together with the opening of the portion of said basket neck defines said passage of said basket neck.

4. The centrifugal filter as defined in claim 1, wherein the portion of the basket neck comprises ribs which form spaces therebetween which are openings of said filter basket neck portion.

5. The centrifugal filter as defined in claim 1, wherein the portion of said machine body supporting said bearing housing comprises a plurality of ribs forming spaces therebetween which are openings of said portion of the machine body.

6. The centrifugal filter as defined in claim 1, wherein said first edge of the filter element is connected via a first fastening device with the filter basket and said second edge of the filter element is connected via a second fastening device with a movable part of said lifting means.

7. The centrifugal filter as defined in claim 1, wherein the distance between said first fastening device and the lifting means is greater than the distance between said second fastening device and the lifting means.

8. The centrifugal filter as defined in claim 1, wherein said lifting means is coaxially disposed with respect to said basket hub and a first part of said lifting means is fixedly connected with said basket hub and a second part is movable and connected with the second edge of said filter element.

9. The centrifugal filter as defined in claim 1, wherein said basket hub comprises a shaft head for said drive shaft and at least one channel for a fluid actuating said lifting means.

6

10. The centrifugal filter as defined in claim 1, wherein the basket neck comprises an annular free space containing a movable part of said lifting means.

11. The centrifugal filter as defined in claim 1, wherein the lifting means is supported by a cover of the collector chamber.

12. The centrifugal filter as defined in claim 11, wherein a movable part of said lifting means is connected with a cover device for the filter basket and wherein the second edge of said filter element is connected to the filter basket.

13. The centrifugal filter as defined in claim 1, wherein said perforated barrel includes a perforated barrel shell and a barrel bottom implemented as a connection between said barrel shell and said basket neck and wherein the diameter of the perforated barrel shell is greater than the diameter of the basket neck.

14. The centrifugal filter as defined in claim 1, wherein said lifting means is a hydraulically actuated piston device.

15. The centrifugal filter as defined in claim 1, wherein said lifting means is an electrically actuated piston device.

16. The centrifugal filter as defined in claim 1, wherein said lifting means is a pneumatically actuated piston device.

17. The centrifugal filter as defined in claim 1, wherein the filter element is a filtering cloth or bag fixed in the upper region of the perforated barrel.

18. The centrifugal filter as defined in claim 1, wherein the filter element is a filtering cloth or bag.

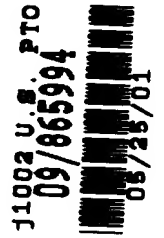
19. The centrifugal filter as defined in claim 1, wherein the machine body has two isolated passage channels in which drive belts for the motion of the drive shaft are disposed.

20. The centrifugal filter as defined in claim 1, wherein the collector chamber is closed with a cover including a center tubular holding device for a lifting body which comprises a lifting platform and a longitudinal guide on which a guide sleeve for a filling tube is rotatable supported, and wherein the guide sleeve is connected with the connection connecting said second edge of said filter element with said lifting body.

21. The centrifugal filter as defined in claim 1, wherein the collector chamber is connected to a drainage tube.

\* \* \* \* \*

## USES FOR THE PARTICULANT EXTRACTOR



The Particulant Extractor has three separate and different applications in the automotive field - two of them being major antipollution processes. It also has other environmental applications - one of which is in the capturing of industrial smoke stack contaminants (pollution), the other being in the clean-up of accidental oil spills in lakes, rivers and oceans. It can also be used to separate water from compressed air - which is utilized in various industrial fields, professional or amateur painting applications and with any type of air tools such as found in dentists offices or automotive maintenance shops etc.

### AUTOMOTIVE USES

The first of the three automotive uses is as an oil extractor.

#### Oil Extractor Primary Function:

Hot oil latent gases from the engine head, after passing through the PCV Valve, are diverted to the oil extractor. The extractor gleans and extracts the oil from the hot gases (thereby removing pollutants) before they can be reintroduced into the engine at the intake where the gases are then burned and churned into the atmosphere through the exhaust. The oil extracted is returned to the engine for use as a lubricant as originally intended.

#### Oil Extractor Secondary Function:

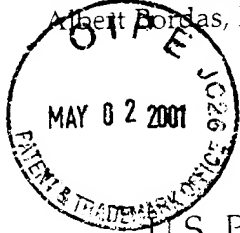
Is to increase combustion efficiency - power and gas mileage. The increase in efficiency is attained because the gases are cleaned and cooled before introduction into the intake thereby creating a cleaner burn.

*Sanchelima & Associates, P.A.*  
*Attorneys at Law*

Patent, Trademark & Copyright Law

J. Sanchelima, Patent Attorney  
Maitte R. Netsch, Esq.  
Albert B. Bortas, Reg. Patent Attorney

Tel: 305-447-1617  
Fax: 305-445-8484  
jay@sanchelima.com  
www.sanchelima.com



May 2, 2001

U.S. Patent and Trademark Office  
Box DD  
Washington, D.C. 20231

Re: *"SEPARATOR FOR FLUIDS AND SOLIDS"*  
Applicant: *Jorge L. Lombana*  
Our file No. 21068

Hon. Commissioner:

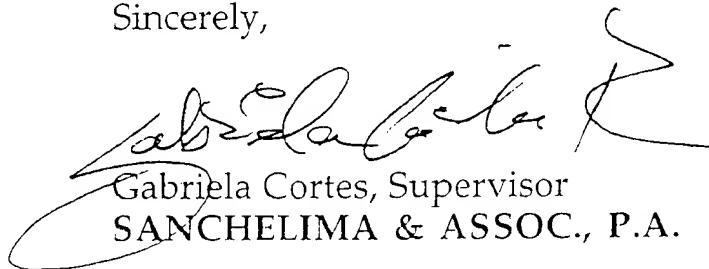
Enclosed please find the following documents for the above referenced matter:

1. Form PTO/SB/95 (Disclosure Document Deposit Request) original and one copy to be returned to our office along with the stamped envelop as soon as it is recorded with a serial number;
2. self-addressed, postage-paid envelope; and
3. description and drawing of the invention.

Kindly charge my Deposit Account No: 19-0129 the pertinent fees for filing this disclosure document. A duplicate copy of this charge authorization is enclosed for your accounting purposes.

Kindly acknowledge receipt of this by stamping the enclosed self-addressed, postage-paid card and returning it back to us.

Sincerely,



Gabriela Cortes, Supervisor  
SANCHELIMA & ASSOC., P.A.

file #3  
JS/vp